Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] A three dimensional, dynamically shielded, high Q BEOL (back end of line) metal element comprising:
a BEOL metal element;
a conductive three dimensional shield element which wraps around the BEOL metal element to substantially reduce or eliminate parasitic capacitive coupling between the BEOL metal element and a conductive substrate, and parasitic shunt capacitance coupling between different adjacent shunt sections of the BEOL metal element.

[c2] The BEOL metal element of claim 1, wherein the three dimensional shield element is dynamically driven to the same electrical potential as the BEOL metal element, to substantially reduce or eliminate the parasitic capacitances of the BEOL metal element.

[c3] The BEOL metal element of claim 2, wherein the three dimensional shield element is dynamically driven to the same electrical potential as the BEOL metal element by a high input impedance unity gain circuit fabricated with the BEOL metal element.

[c4] The BEOL metal element of claim 3, wherein the high in-

put impedance unity gain circuit comprises an emitter follower or source follower circuit.

[c5] The BEOL metal element of claim 1, wherein the three dimensional shield element includes a lower shield surface having a width greater than the width of the BEOL metal element, and opposed side shield surfaces which extend upwardly from opposite side edges of the lower shield surface and are spaced from opposite sides of the BEOL metal element, such that the three dimensional shield element forms a U shaped shield which wraps around the BEOL metal element.

[c6] The BEOL metal element of claim 5, wherein the opposed side shield surfaces are fabricated using minimally spaced square vias.

[c7] The BEOL metal element of claim 5, wherein the opposed side shield surfaces are fabricated using long bar vias.

[c8] The BEOL metal element of claim 1, wherein the BEOL metal element comprises a BEOL upper inductor element.

[c9] The BEOL metal element of claim 8, wherein the three dimensional shield element is dynamically driven to the same electrical potential as the BEOL upper inductor element, to substantially reduce or eliminate the parasitic capacitances of the BEOL upper inductor element.

[c10] The BEOL metal element of claim 9, wherein the three dimensional shield element includes a lower shield surface having a width greater than the width of the BEOL upper inductor element, and opposed side shield surfaces which extend upwardly from opposite side edges of the lower shield surface and are spaced from opposite sides of the BEOL upper inductor element, such that the three dimensional shield element forms a U shaped shield which wraps around the BEOL upper inductor element.

[c11] The BEOL metal element of claim 10, wherein the opposed side shield surfaces are fabricated using minimally spaced square vias.

[c12] The BEOL metal element of claim 10, wherein the opposed side shield surfaces are fabricated using long bar vias.

[c13] The BEOL metal element of claim 10, wherein the BEOL upper inductor element comprises a two dimensional convoluted conductor element with a series of linear conductor segments separated by angular bends, such that the series of linear conductor segments and angular bends enable the conductor element to convolute within itself and terminate in an inner end near the center of the convoluted conductor element, and the three dimen-

sional shield element is formed below and follows the convoluted shape of the conductor element.

[c14] The BEOL metal element of claim 1, wherein the BEOL metal element comprises a BEOL metal interconnect.

[c15] The BEOL metal element of claim 14, wherein the three dimensional shield element is dynamically driven to the same electrical potential as the BEOL metal element, to substantially reduce or eliminate the parasitic capacitances of the BEOL metal element.

[c16] The BEOL metal element of claim 15, wherein the three dimensional shield element includes a lower shield surface having a width greater than the width of the BEOL metal element, and opposed side shield surfaces which extend upwardly from opposite side edges of the lower shield surface and are spaced from opposite sides of the BEOL metal element, such that the three dimensional shield element forms a U shaped shield which wraps around the BEOL metal element.

[c17] The BEOL metal element of claim 16, wherein the opposed side shield surfaces are fabricated using minimally spaced square vias.

[c18] The BEOL metal element of claim 16, wherein the opposed side shield surfaces are fabricated using long bar

vias.

[c19] The BEOL metal element of claim 1, wherein the BEOL metal element comprises a BEOL MIM (metal-insulator-metal) capacitor.

[c20] The BEOL metal element of claim 19, wherein the three dimensional shield element is dynamically driven to the same electrical potential as the BEOL metal element, to substantially reduce or eliminate the parasitic capacitances of the BEOL metal element.

[c21] The BEOL metal element of claim 20, wherein the three dimensional shield element includes a lower shield surface having a width greater than the width of the BEOL metal element, and opposed side shield surfaces which extend upwardly from opposite side edges of the lower shield surface and are spaced from opposite sides of the BEOL metal element, such that the three dimensional shield element forms a U shaped shield which wraps around the BEOL metal element.

[c22] The BEOL metal element of claim 21, wherein the opposed side shield surfaces are fabricated using minimally spaced square vias.

[c23] The BEOL metal element of claim 21, wherein the opposed side shield surfaces are fabricated using long bar

vias.

[c24] The BEOL metal element of claim 1, wherein the BEOL metal element comprises a BEOL wire bond pad.

[c25] The BEOL metal element of claim 24, wherein the three dimensional shield element is dynamically driven to the same electrical potential as the BEOL metal element, to substantially reduce or eliminate the parasitic capacitances of the BEOL metal element.

[c26] The BEOL metal element of claim 25, wherein the three dimensional shield element includes a lower shield surface having a width greater than the width of the BEOL metal element, and opposed side shield surfaces which extend upwardly from opposite side edges of the lower shield surface and are spaced from opposite sides of the BEOL metal element, such that the three dimensional shield element forms a U shaped shield which wraps around the BEOL metal element.

[c27] The BEOL metal element of claim 26, wherein the opposed side shield surfaces are fabricated using minimally spaced square vias.

[c28] The BEOL metal element of claim 26, wherein the opposed side shield surfaces are fabricated using long bar vias.

[c29] The BEOL metal element of claim 1, wherein the BEOL metal element comprises a BEOL stable bias line for a memory.

[c30] The BEOL metal element of claim 29, wherein the three dimensional shield element is dynamically driven to the same electrical potential as the BEOL metal element, to substantially reduce or eliminate the parasitic capacitances of the BEOL metal element.

[c31] The BEOL metal element of claim 30, wherein the three dimensional shield element includes a lower shield surface having a width greater than the width of the BEOL metal element, and opposed side shield surfaces which extend upwardly from opposite side edges of the lower shield surface and are spaced from opposite sides of the BEOL metal element, such that the three dimensional shield element forms a U shaped shield which wraps around the BEOL metal element.

[c32] The BEOL metal element of claim 31, wherein the opposed side shield surfaces are fabricated using minimally spaced square vias.

[c33] The BEOL metal element of claim 31, wherein the opposed side shield surfaces are fabricated using long bar vias.